Name:	***Advanced Concepts in Structural Fire Protection***
Course Description:	This course examines the principles and concepts for structural fire protection involving both fire resistance and the behavior (thermal strain, stress and fatigue) of structural components during fire conditions.
Prerequisites	FESHE core courses or equivalent
Outcomes:	1. Analyze case studies from historical fires related to structural collapse and failure and emphasis on fire protection systems design. 2. Identify the principle structural components and evaluate the five types of building construction addressing special hazards and tactical considerations. 3. Develop and calculate approved fire resistance ratings employing established principles and models. 4. Describe the design objectives of fire resistance properties of assemblies including walls, floors, beams, columns, fire barriers and penetrations. 5. Describe the behavior of structural components and their mechanical properties (thermal strain, stress and fatigue) under fire conditions. 6. List and apply the “Ten Rules of Fire Endurance Rating”, according to ‘Harmathy’. 7. Evaluate occupancy designations and their respective fire resistance requirements according to state, local and regional building codes. 8. Describe the industry fire-resistive testing processes (e.g. ASTM E-119 test) for fire load, severity, and fire endurance according to NFPA and UL. 9. Evaluate the fire protection systems (e.g. spray on coatings, flame shields, encasements, barriers) for structural components in accordance with fire industry standards. 10. Identify the indicators of potential structural failure as they relate to firefighter safety and analyze the causes involved in the line of duty firefighter deaths related to structural firefighting. 11. Identify and analyze the causes involved in the line of duty firefighter deaths related to structural and wildland firefighting, training and research and the reduction of emergency risks and accidents

Supporting References/Research for Faculty and Students:	**U.S. Fire Administration** *Advanced Concepts in Structural Fire Protection*, U. S. Fire Administration Publications: http://www.usfa.dhs.gov/applications/publications See Fire Data, Fire Protection, Fire Service Operations, Health and Safety Applied Research: http://www.usfa.dhs.gov Research Reports: http://www.usfa.dhs.gov Technical Reports: http://www.usfa.dhs.gov/applications/publications Lessons Learned Information Sharing: http://www.llis.dhs.gov/member/secure/index.cfm Topical Fire Research Series: http://www.usfa.dhs.gov/research Learning Resource Center: http://www.lrc.fema.gov **National Institute for Standards and Technology** http://www.fire.nist.gov: See Publications, FIREDOC (under Publications) Lessons Learned Information Sharing: http://www.llis.dhs.gov/member/secure/index.cfm http://www.usfa.dhs.gov/applications/publications/techreps.cfm **References** NFPA and UL Codes and standards Society of Fire Protection Engineers: http://www.pentoncmg.com/sfpe/index.html **Current Events/News** http://www.firehouse.com http://www.fireengineering.com http://www.withthecommand.com
Assessment:	Students will be evaluated for mastery of learning objectives by methods of evaluation to be determined by the instructor.
Points of Contact:	Chris Jelenewicz, P.E., cjelenewicz@fpe.org (301) 718-2910 Jeff Robinson, P.E., Jeffrey.robinson@srs.gov (803) 208-0353 Ralph K. De La Ossa,, (562) 938-4338, rdelaossa@lbcc.edu **Revision: 11-15-05**

Course Outline

Advanced Concepts in Structural Fire Protection

I. Introduction
- A. History of Structural Fire Protection
- B. Governmental Functions, Building and Fire Codes
- C. Design of Fire Protection
- D. Fire Loss Management and Life Safety
- E. Pre-fire Planning and Fire Suppression Strategies

II. Principles of Fire Protection
- A. Terminology and Definitions
- B. Occupancy Classifications
- C. Characteristics of Fire Protection Materials

III Structural Members
- A. Structural Design
- B. System Failures
- C. Fire Protection Materials
- D. Definitions, Descriptions

III. Principles of Fire Resistance
- A. Standards of Material Construction
- B. Fire Intensity and Duration
- C. Assemblies
- D. Walls
- E. Floors
- F. Beams
- G. Columns
- H. Barriers
- I. Penetrations
- J. Theory vs. Reality

IV. Fire Behavior vs. Building Construction
- A. Flame Spread
- B. Smoke and Fire Containment
  1. Construction and Suppression Systems
  2. HVAC Systems

V. Steel Construction
- A. Definitions Of Structural Members
- B. Fire Resistance and Fire Protection of Structural Members

VI. High Rise Construction
- A. Protection Of Structural Members
- B. Vertical and Horizontal Protection Design
- C. Fire Protection and Suppression Systems
- D. Elevators Design Of Protection Materials